

Landscape Level Identification of Ecologically Significant Places in the Upper Midwest

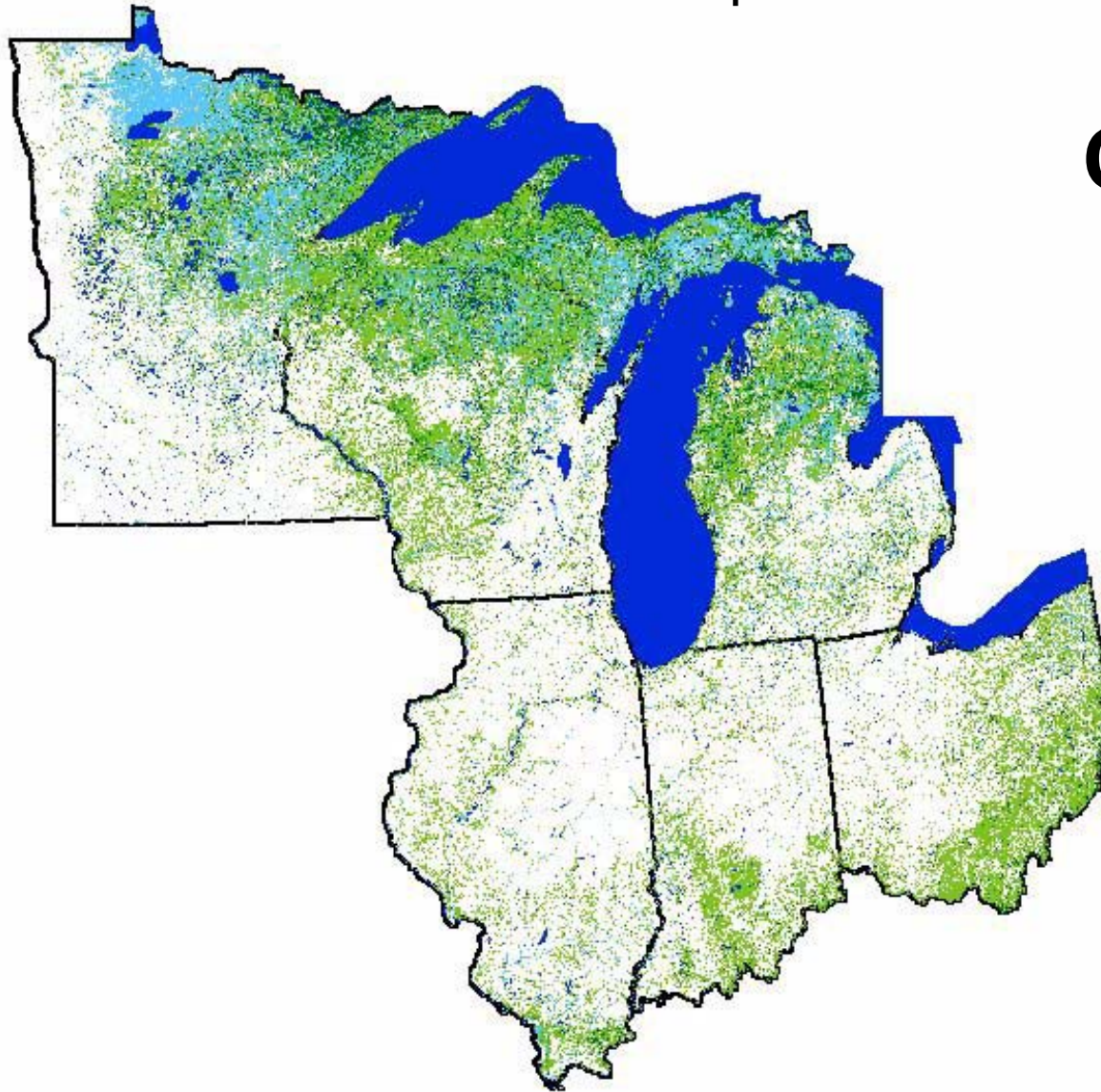
Landscape Level Criteria

Areas containing the highest:

1. Potential for indigenous ecological **"Diversity"**
2. Potential for long-term self **"Sustainability"**
3. Land cover and species **"Rarity"**

1992 Satellite Land Cover Imagery

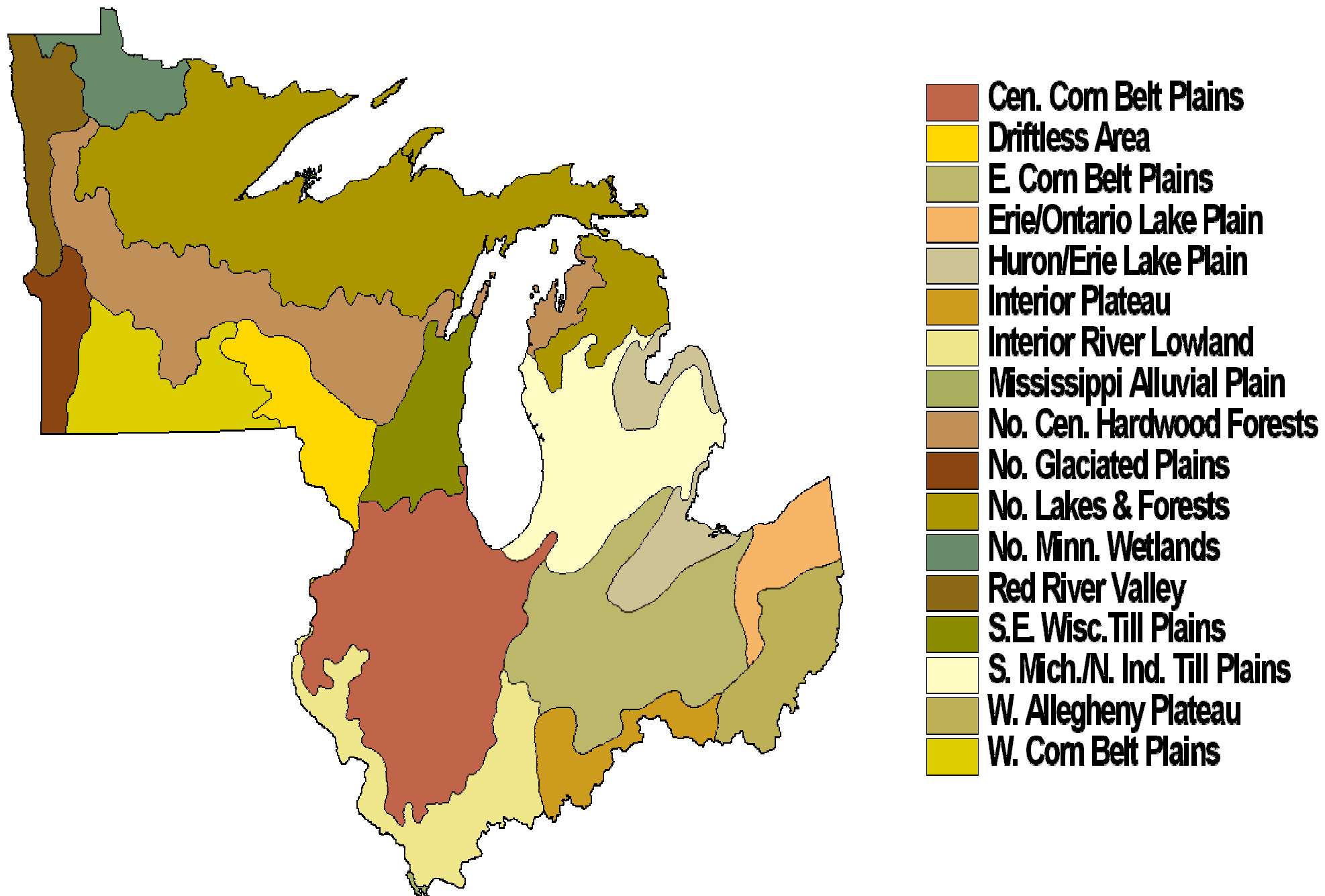
30m x 30m pixel resolution



Classifications

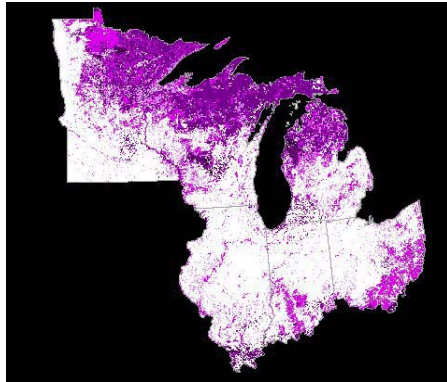
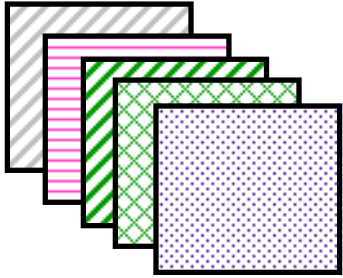


Omernik Ecoregions



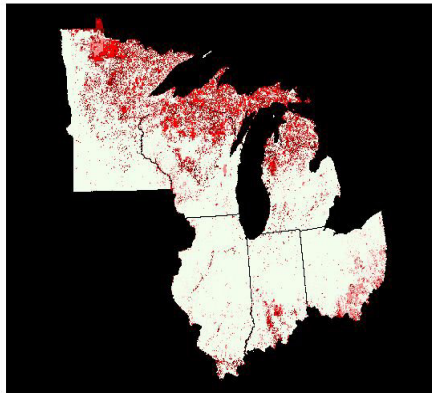
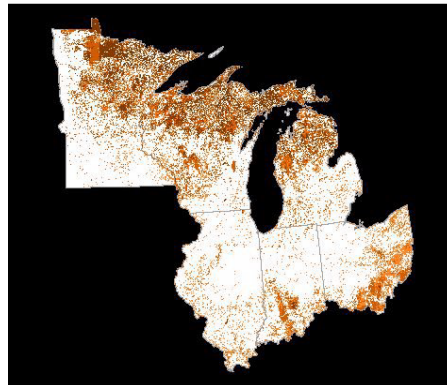
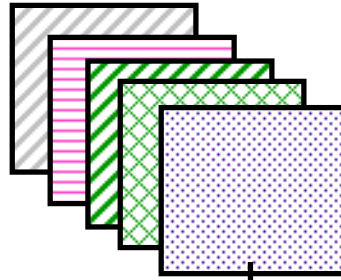
Diversity

(4 data layers)



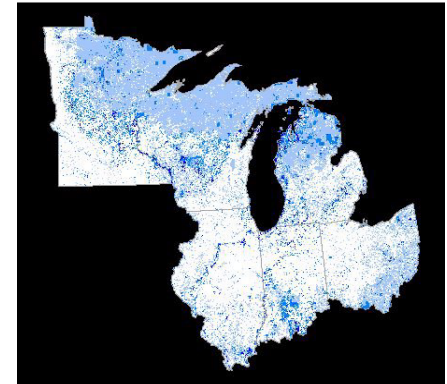
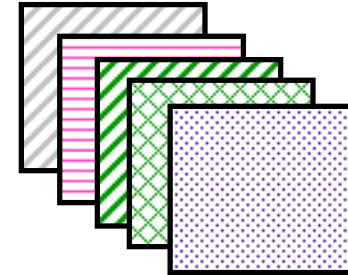
Sustainability

(12 data layers)



Rarity

(4 data layers)



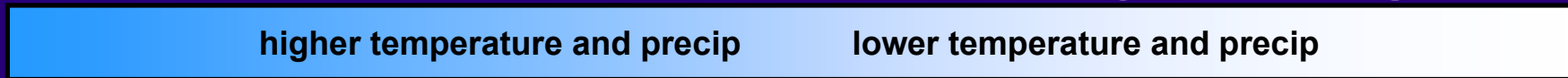
"Diversity" Layers



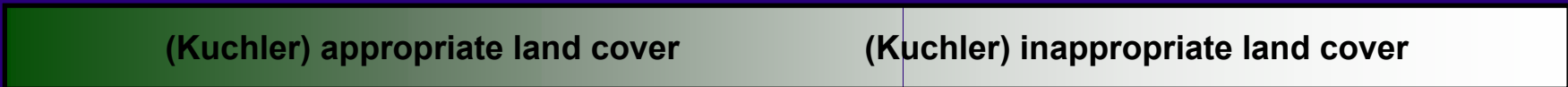
Land cover diversity calculation by ecoregion



Temp. and precipitation maxima by ecoregion



Appropriateness of land cover

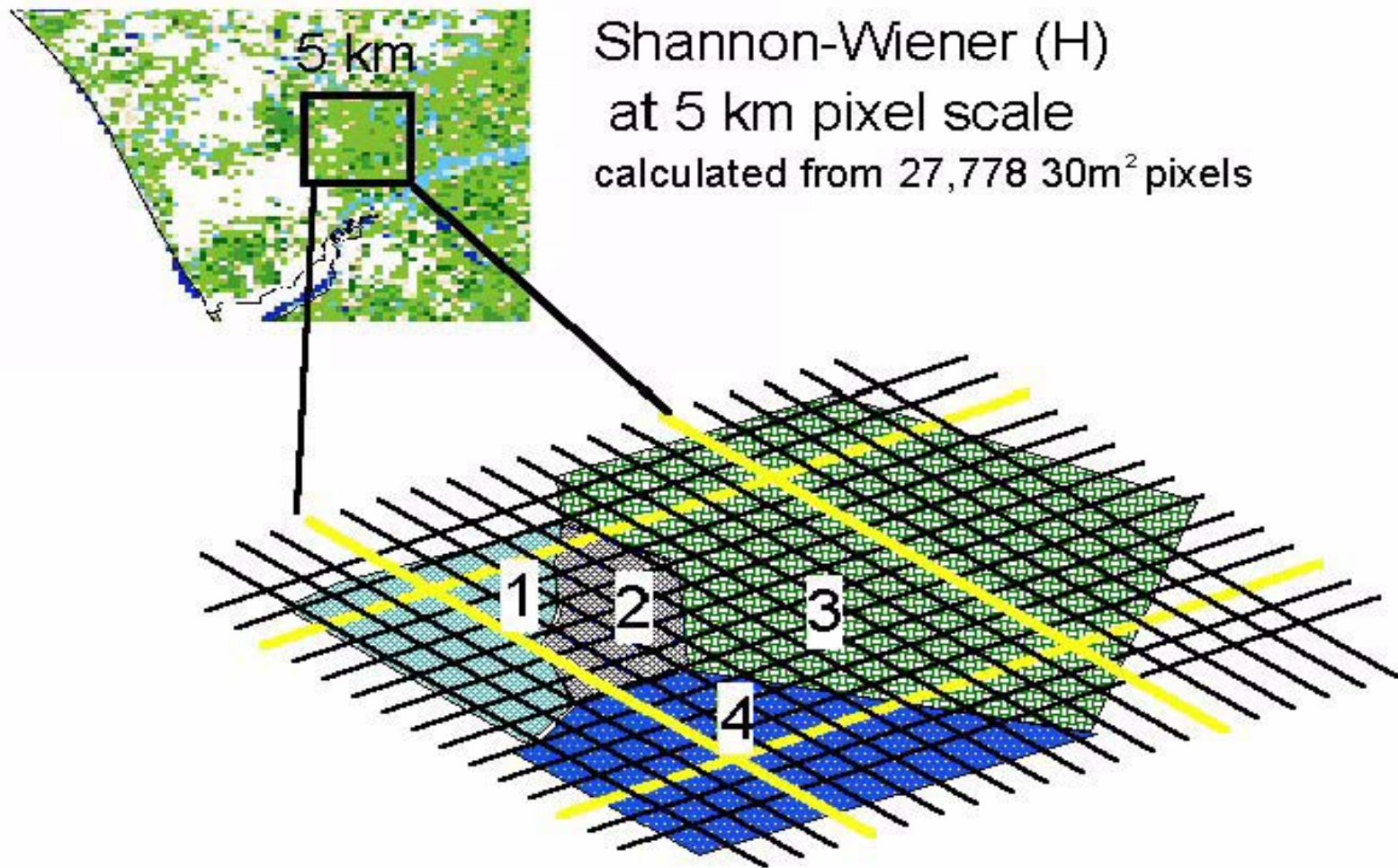


Contiguous sizes of undeveloped areas

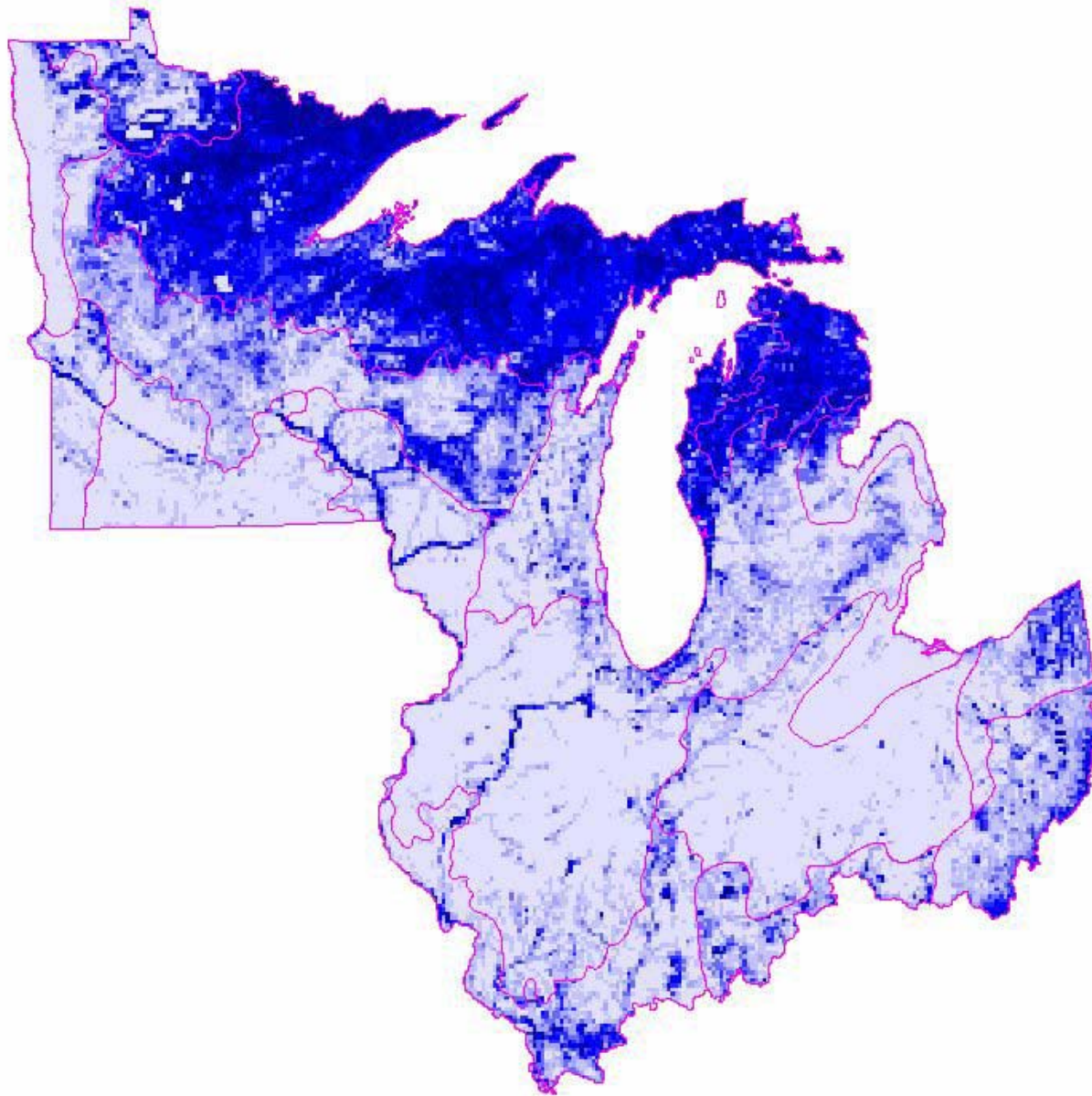


Land Cover Diversity

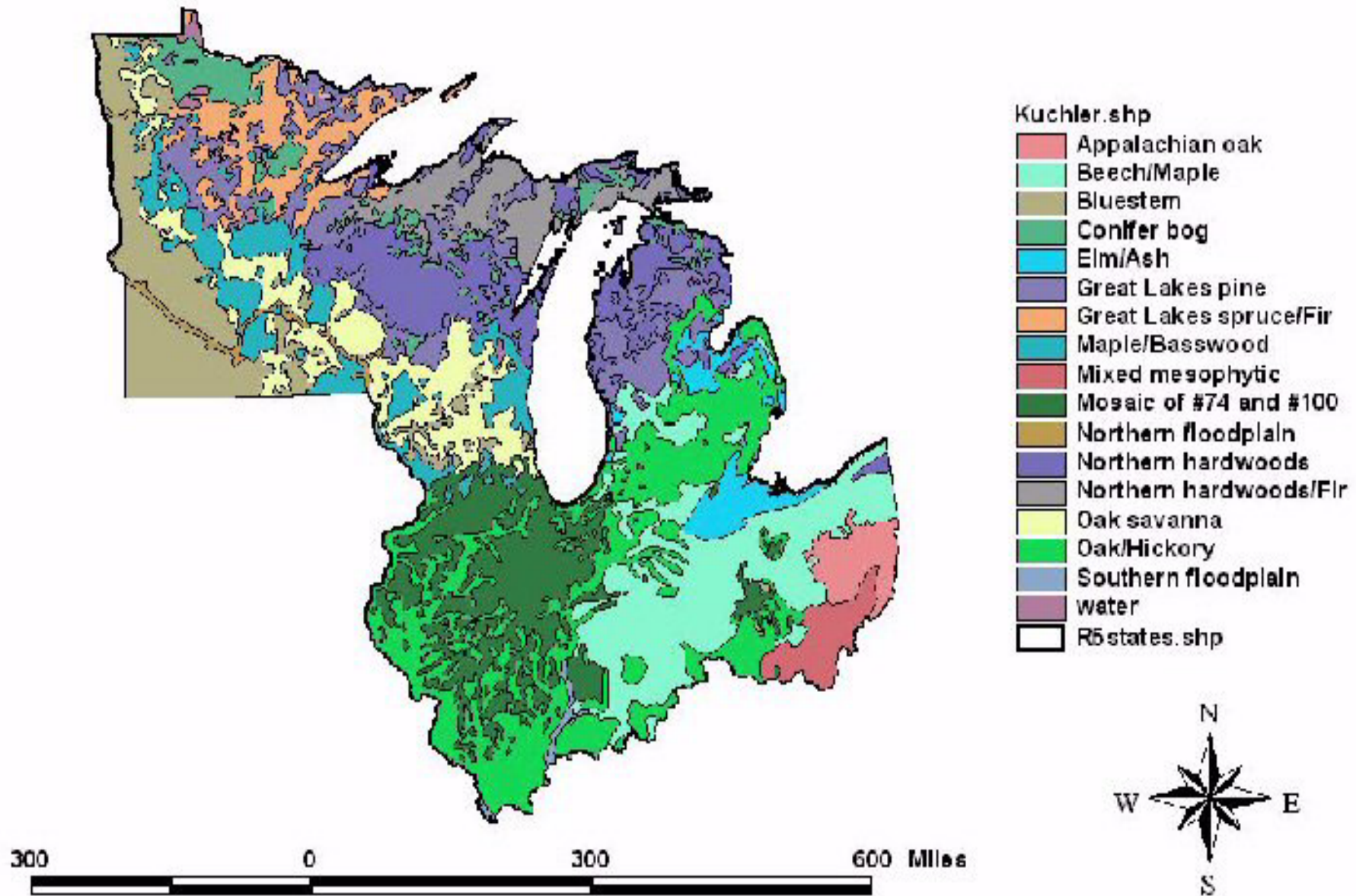
Landcover Diversity



Land Cover Diversity

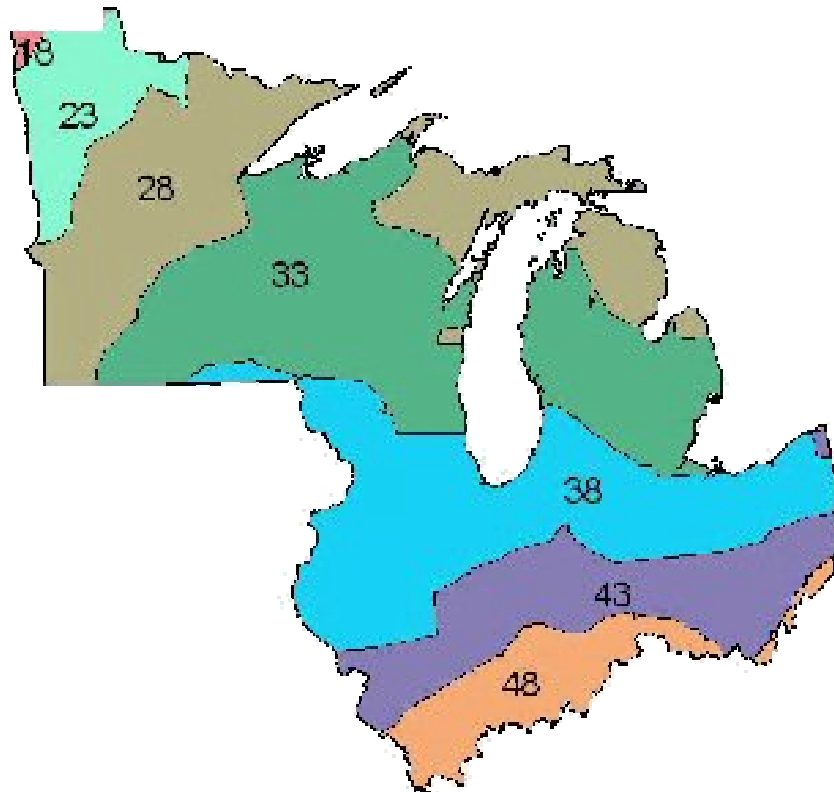


Kuchler Natural Vegetation

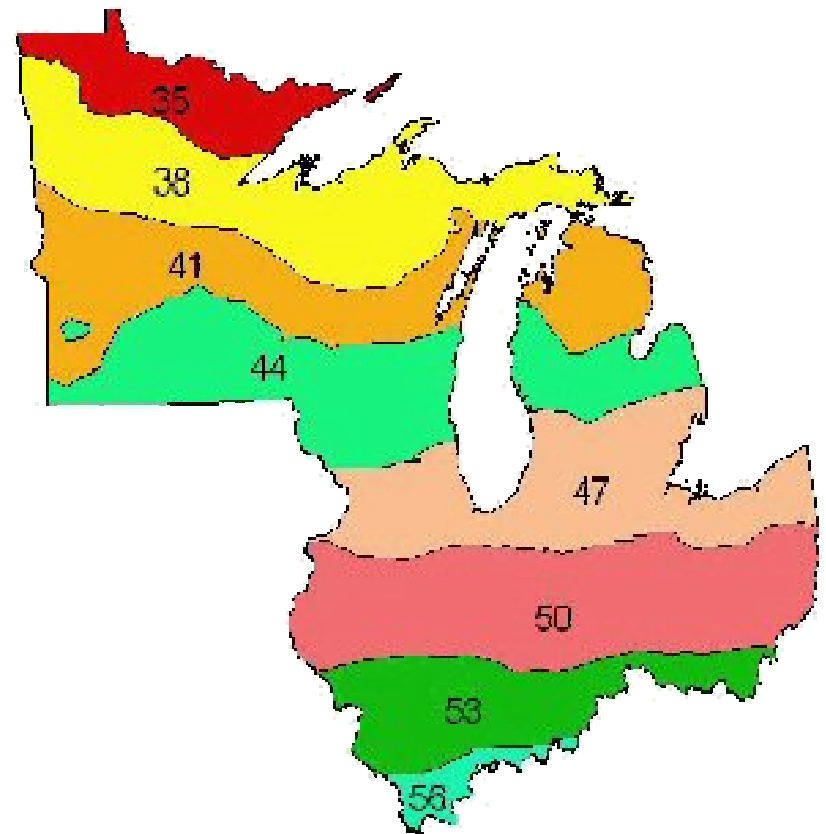


Temperature & Precipitation Maxima

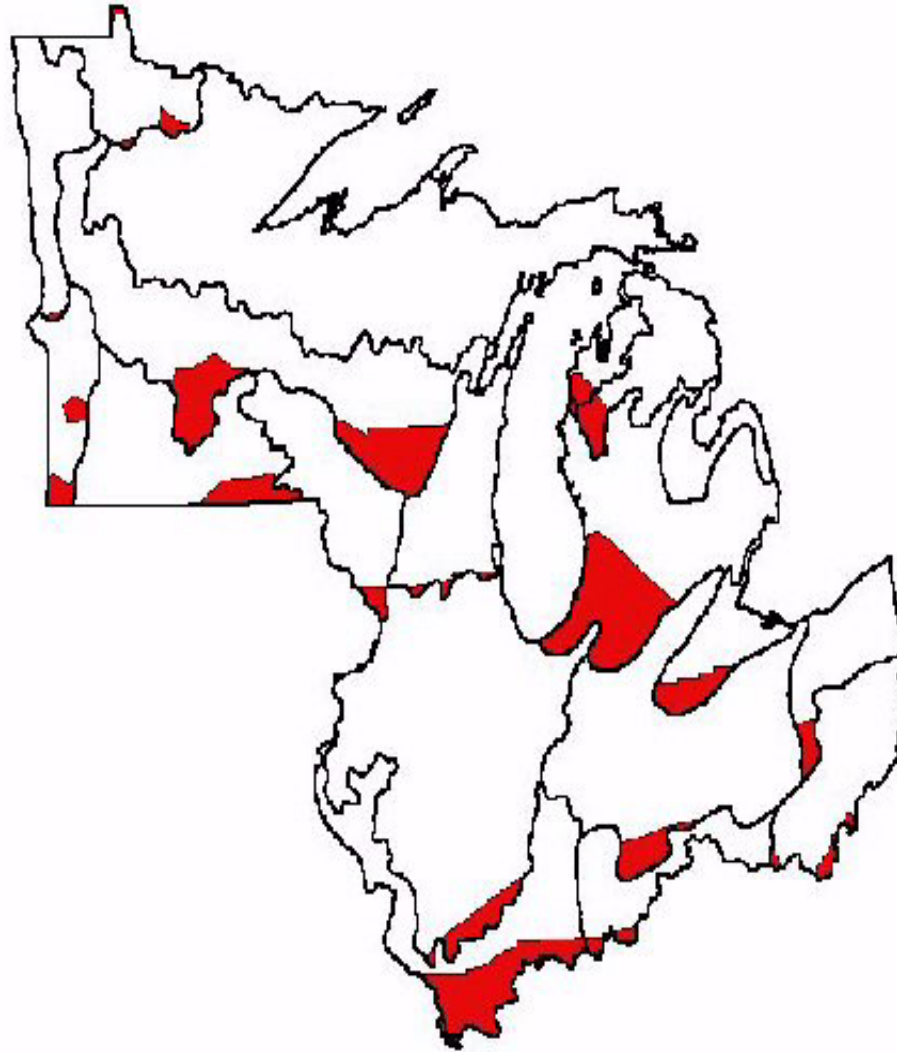
**average precipitation
1990-1999**



**average temperature
1990-1999**

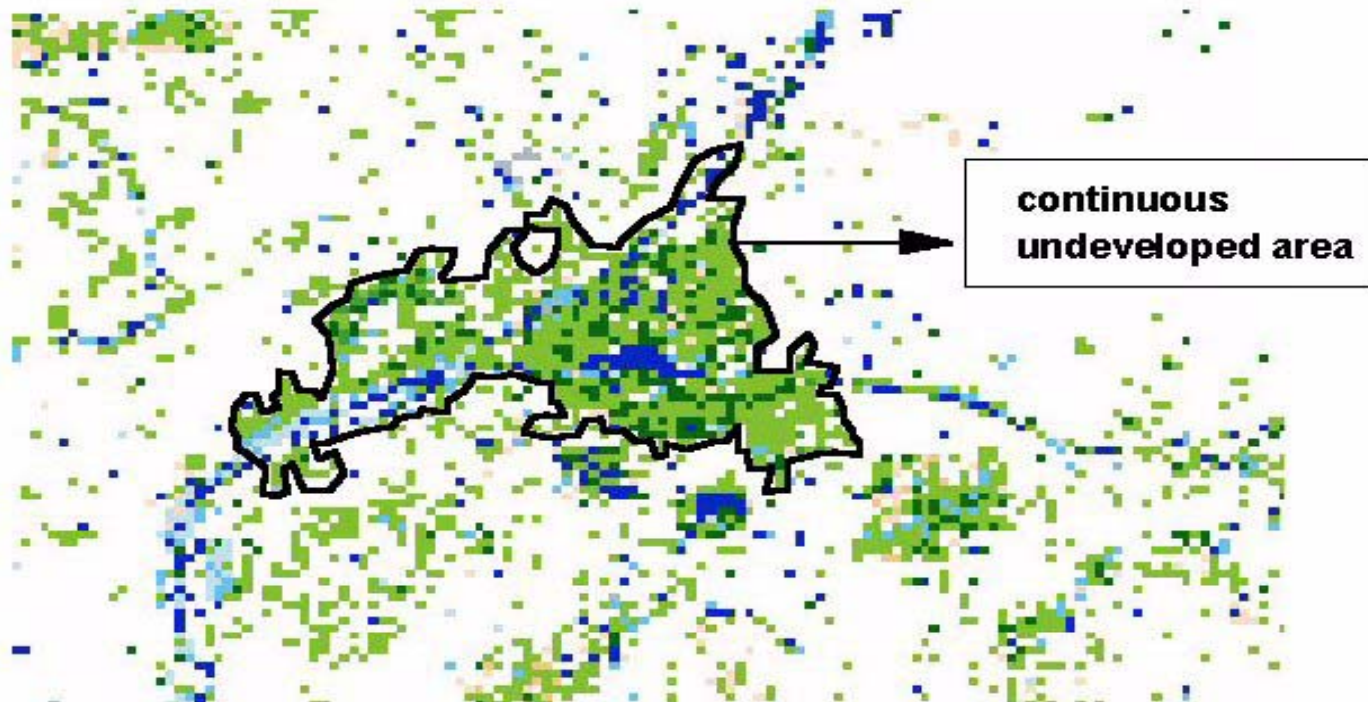


Temperature & Precipitation Maxima



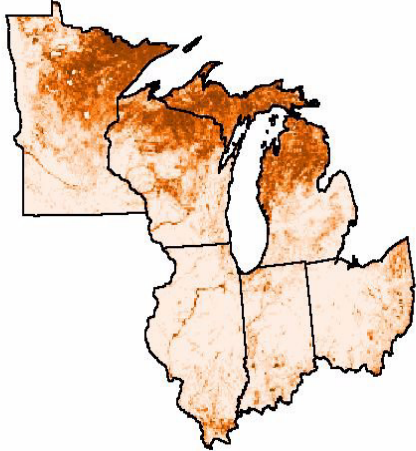
Contiguous Size By Undeveloped Patch

Area of contiguous polygons

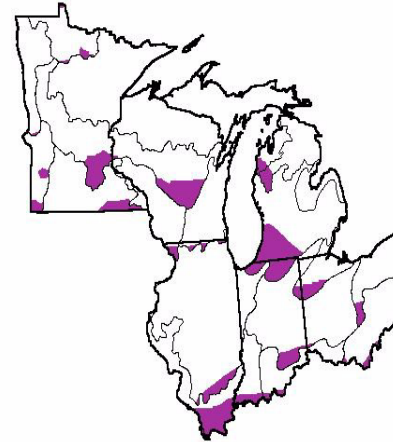


"Diversity" Layers

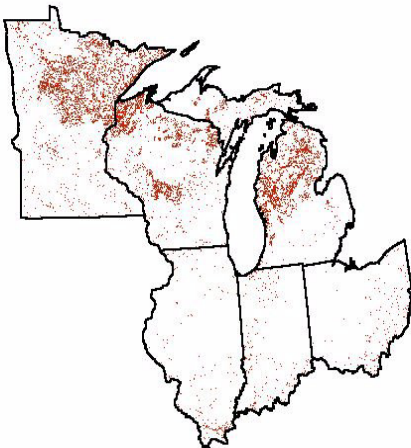
Land Cover Diversity



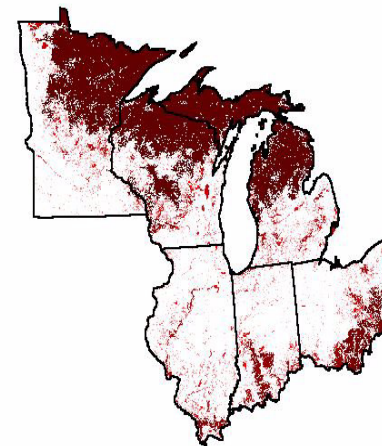
Temp/Precip Maxima



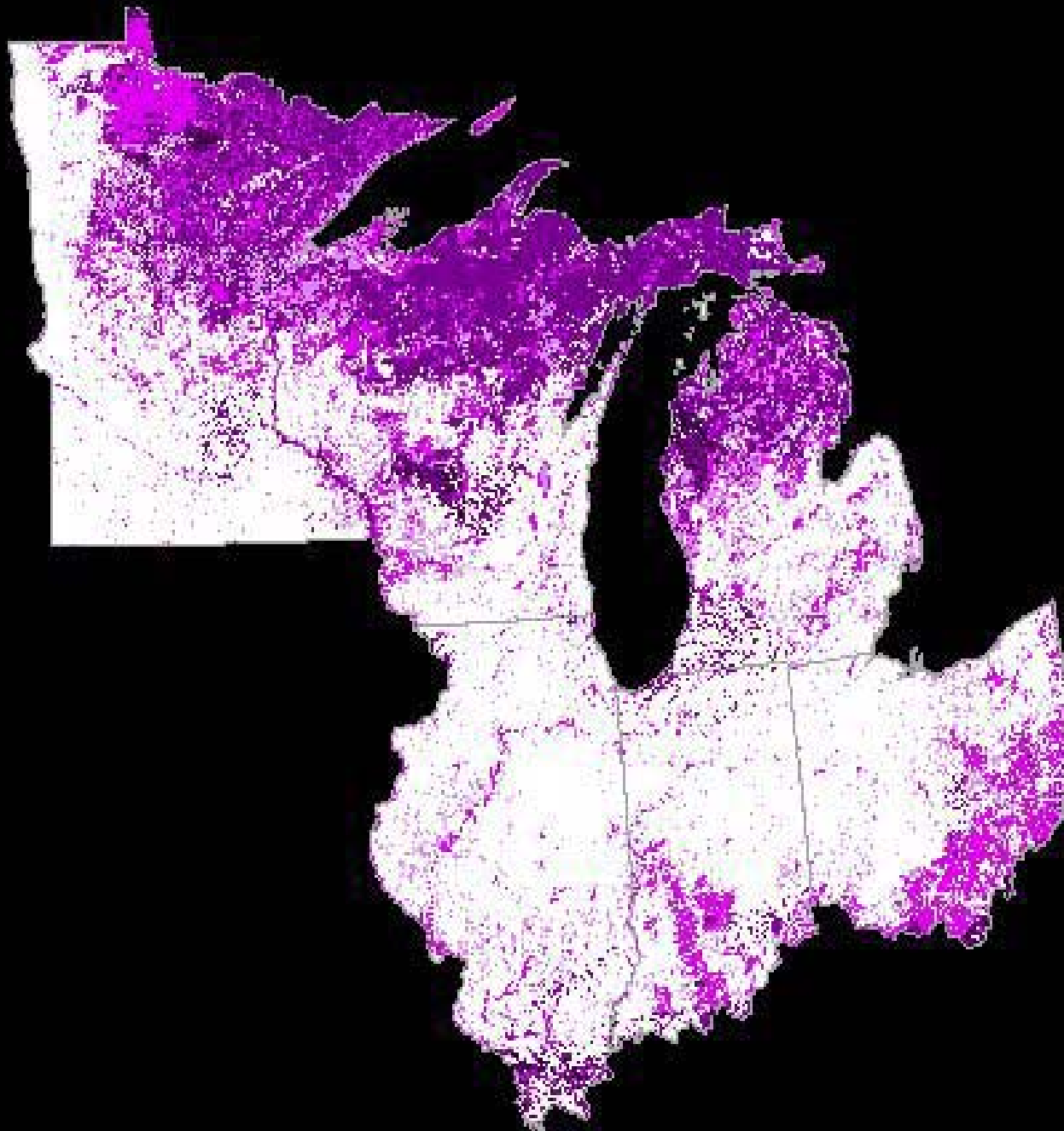
Temporal Continuity



Undeveloped Patch Sizes

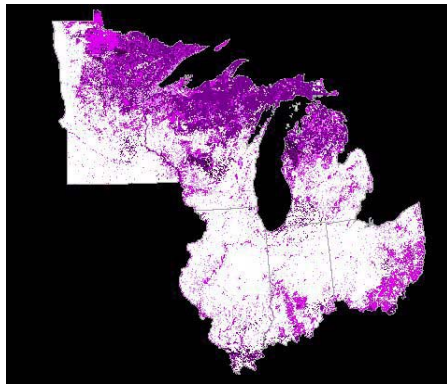
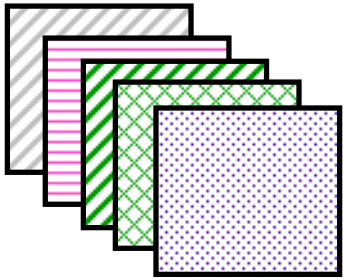


"Diversity" Composite Layer



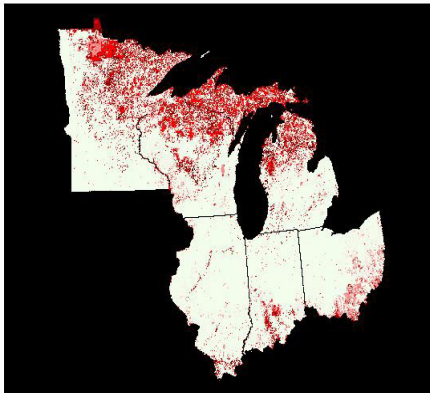
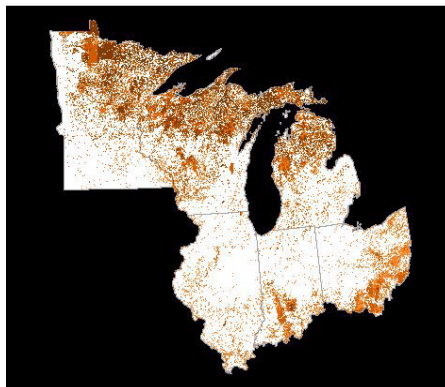
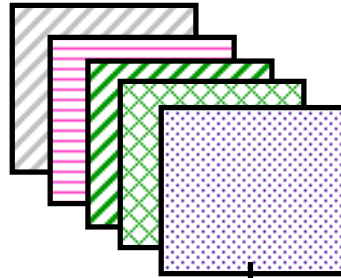
Diversity

(4 data layers)



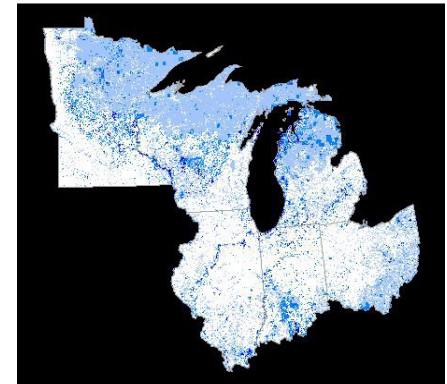
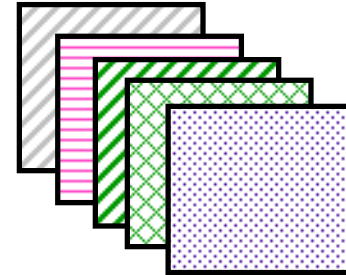
Sustainability

(12 data layers)



Rarity

(4 data layers)



"Fragmentation" Layers



area / perimeter calculation



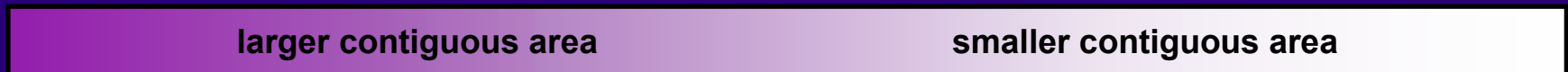
waterway impoundments per waterbody



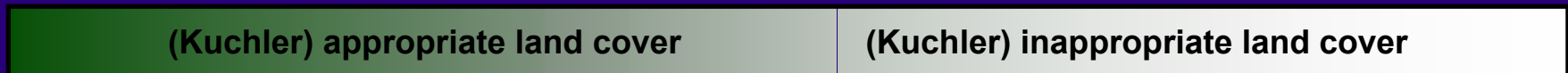
Road Density



Contiguous sizes of individual land cover types



Appropriateness of land cover



"Stress" Layers

100 less stressed (better) ← → more stressed (worse) 0

airport noise and aerosols

land outside of airport buffer zone

land within airport buffer zone

Superfund NPL sites

land outside NPL sites

land within NPL sites

hazardous waste cleanup sites

land outside RCRA site zone

land inside RCRA site zone

water quality summary from BASINS model

low N, sediment, high O₂

high N, sediment, low O₂

air quality from OPPT air risk model

fewer exceedances of thresholds

more exceedances of thresholds

waterway obstructions

fewer dams per HUC

more dams per HUC

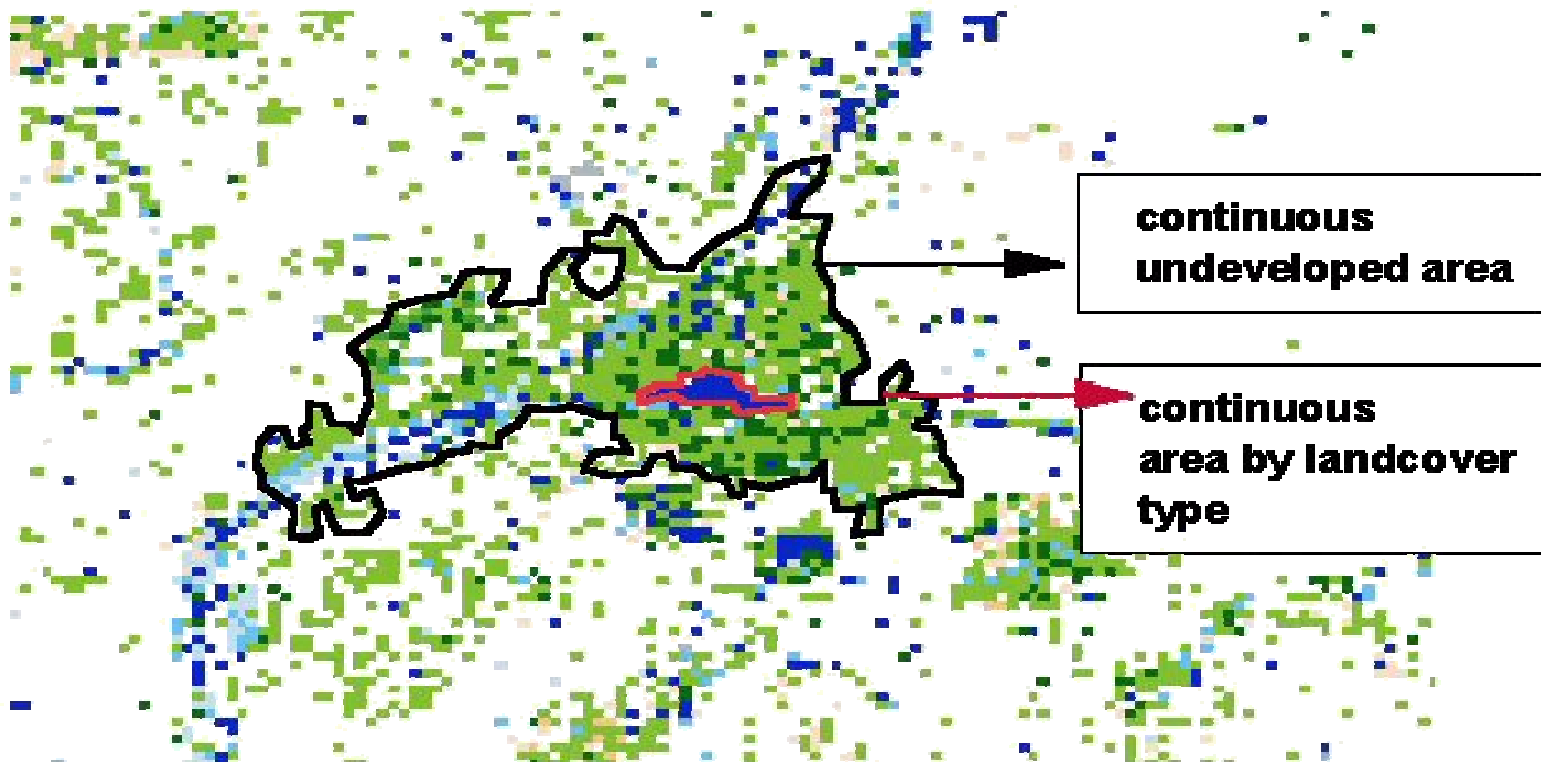
urban disturbance

land further from developed area

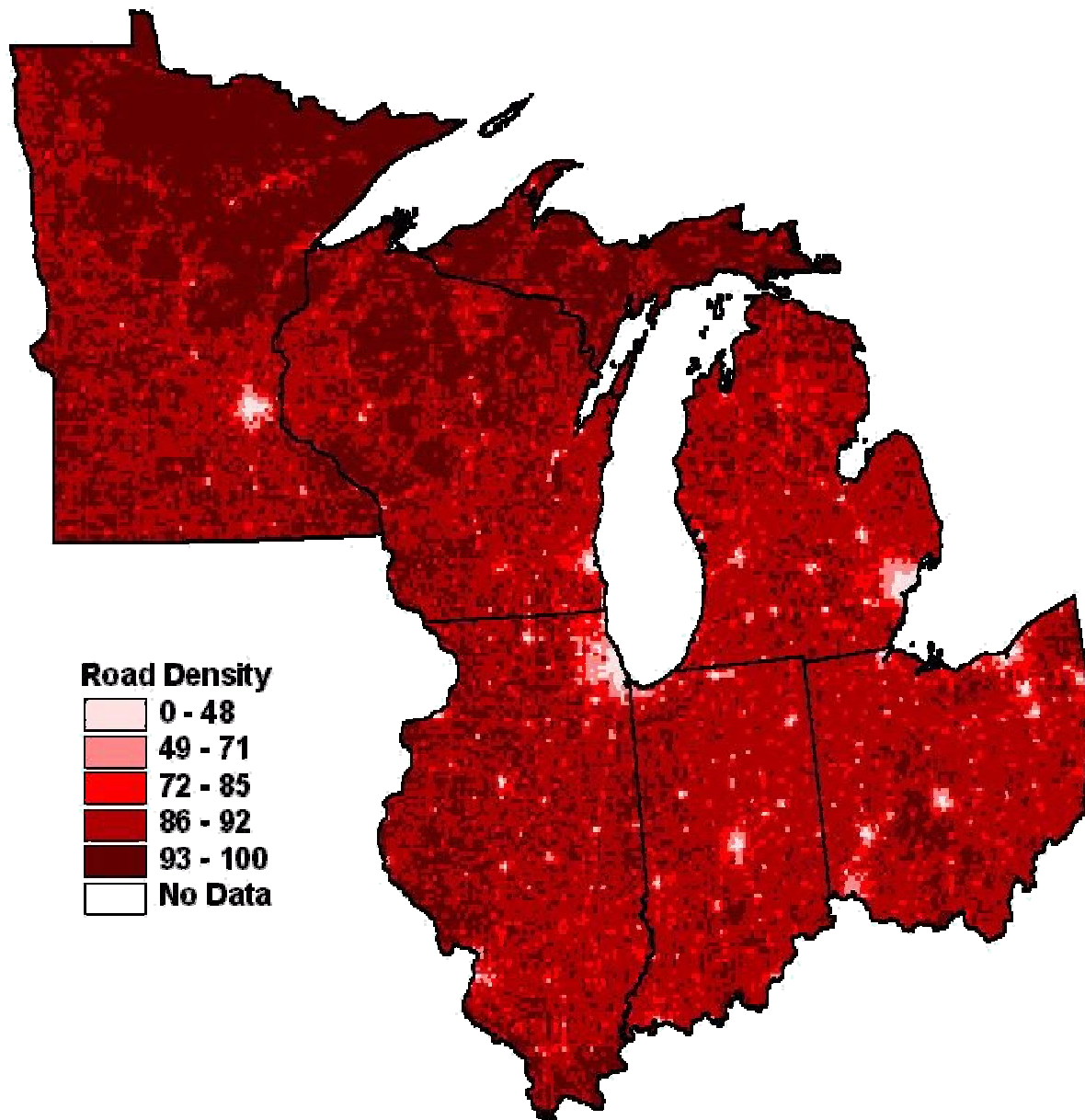
land closer to developed area

Contiguous Size By Land Cover Type

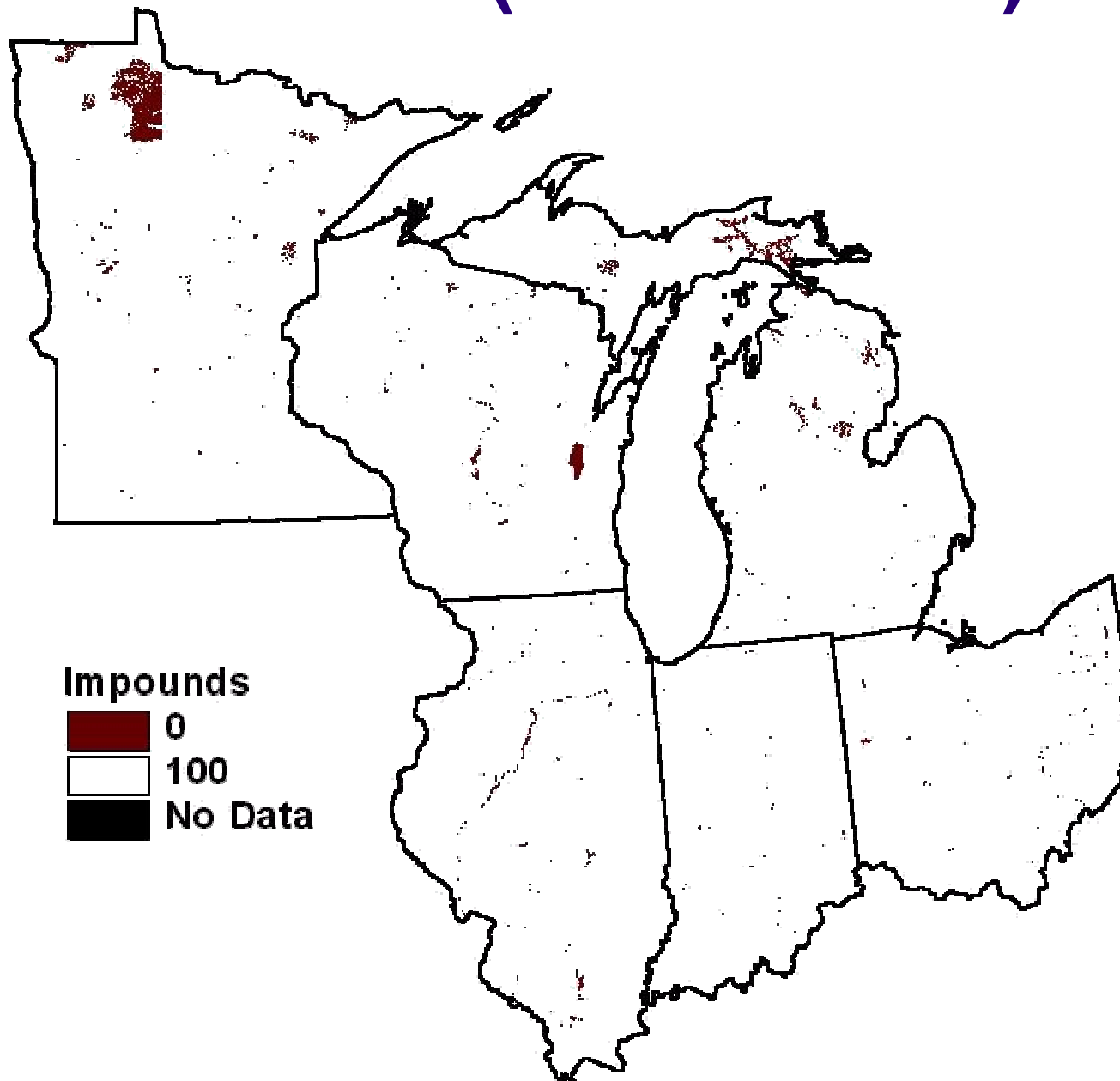
Area of contiguous polygons



Road Density



Waterway Impoundments (Reservoirs)

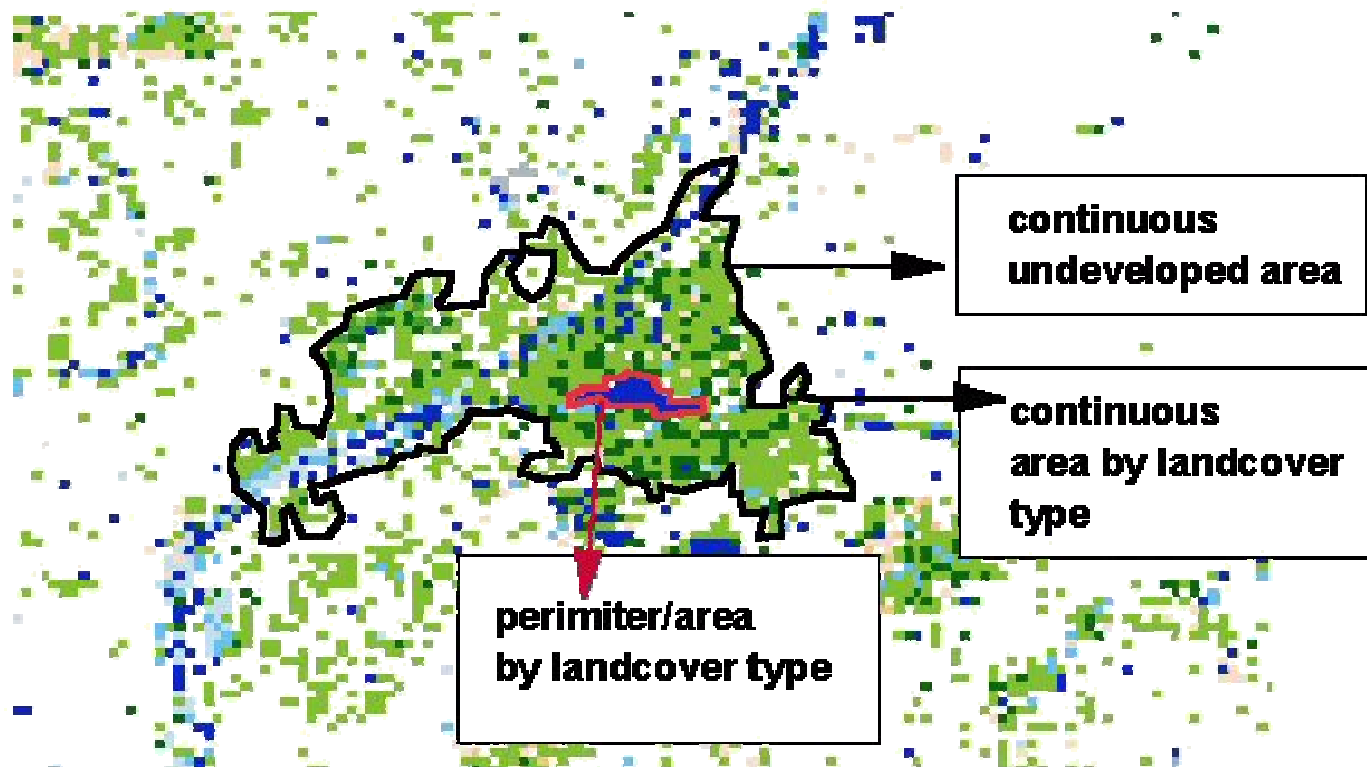


Contiguous Size by Land Cover Type

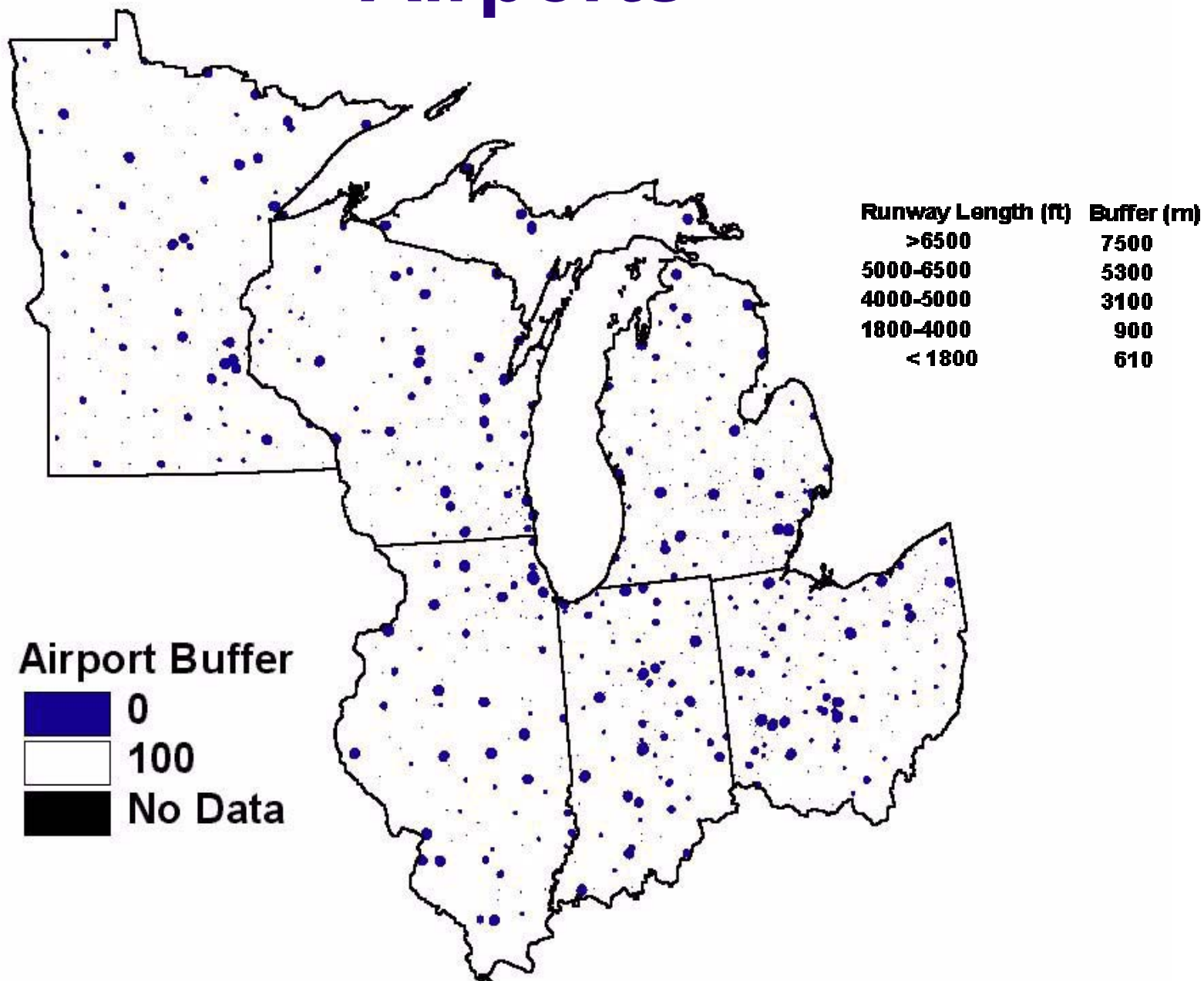
and

Patch Irregularity

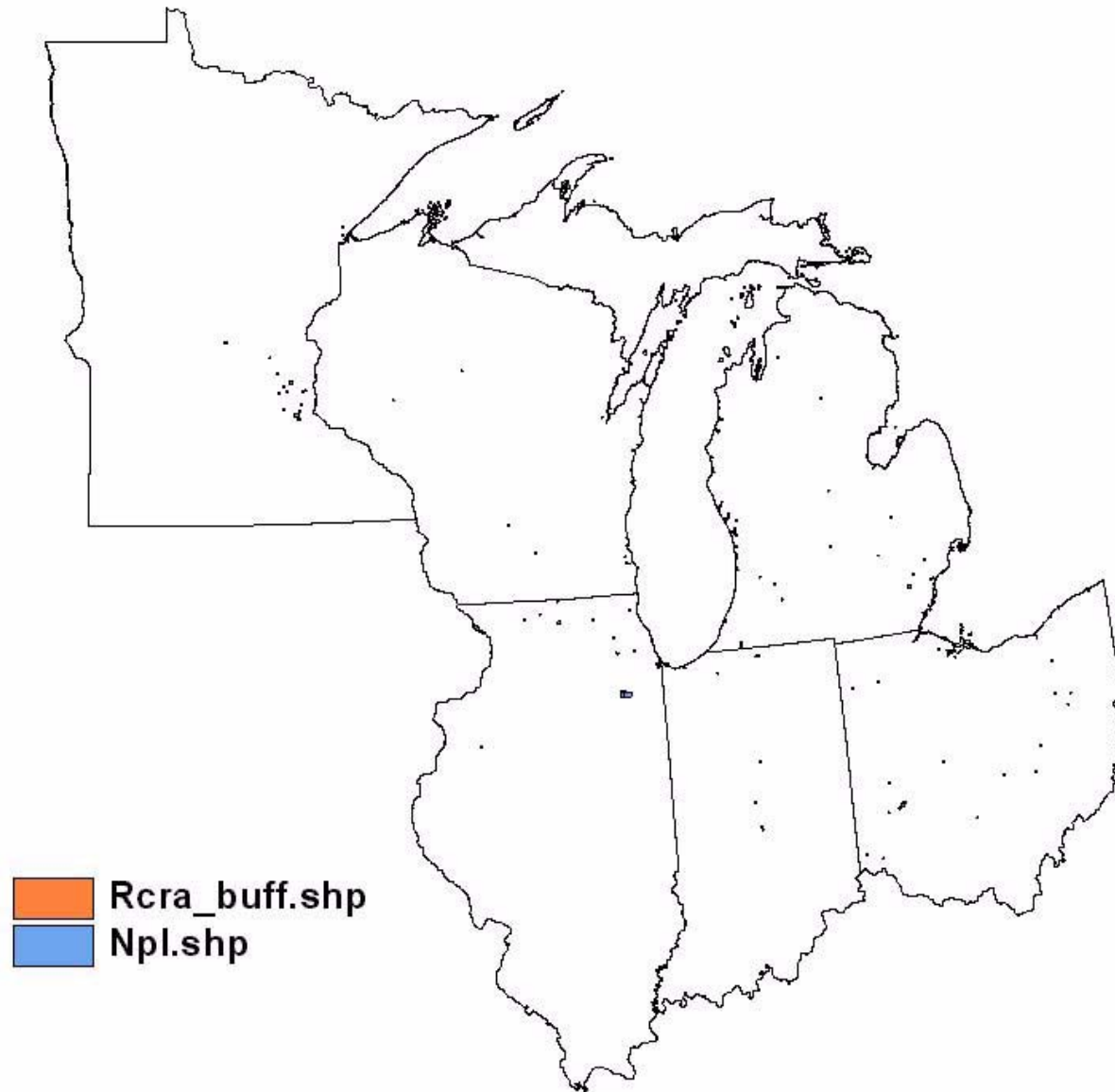
Area of contiguous polygons



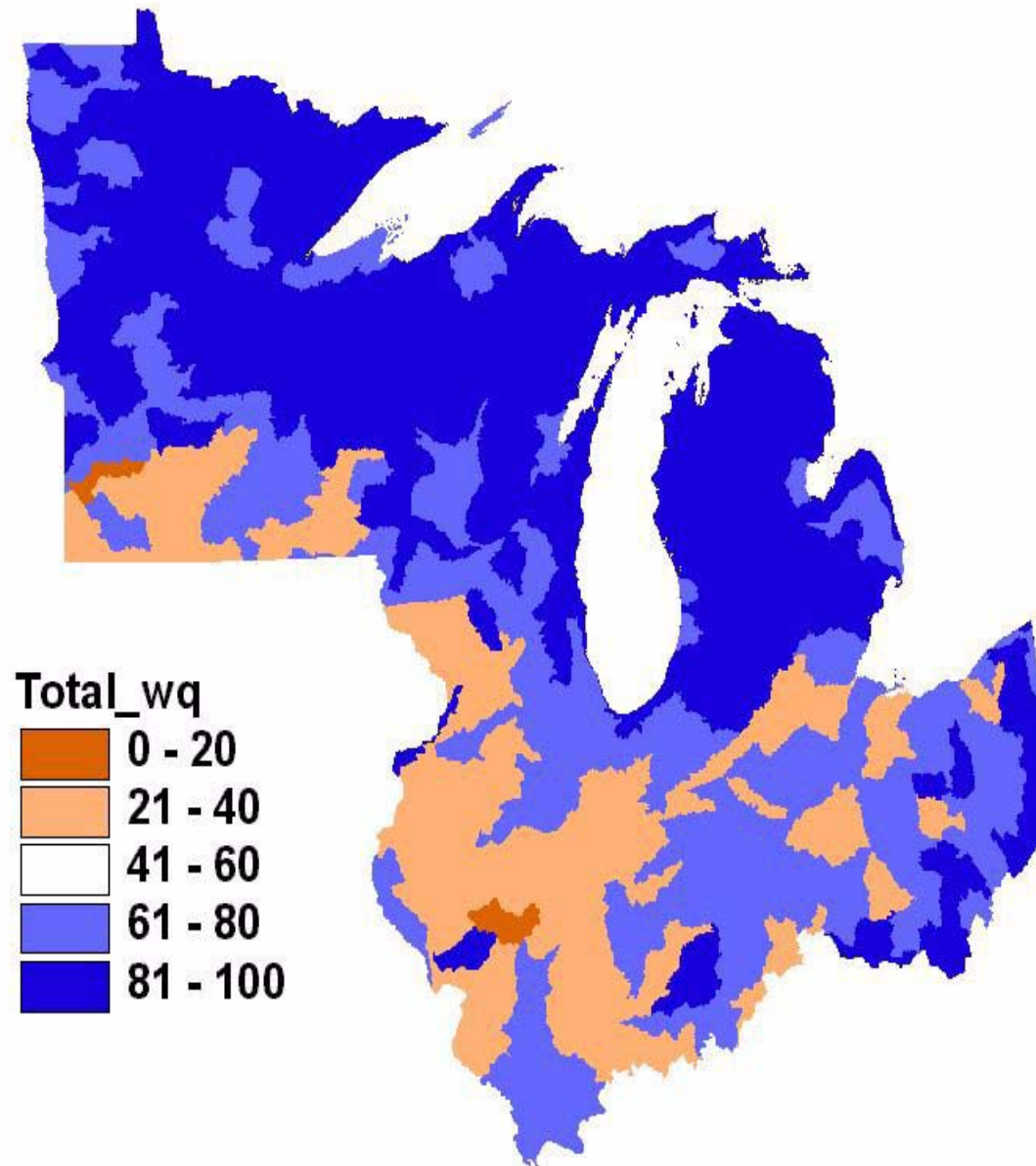
Airports



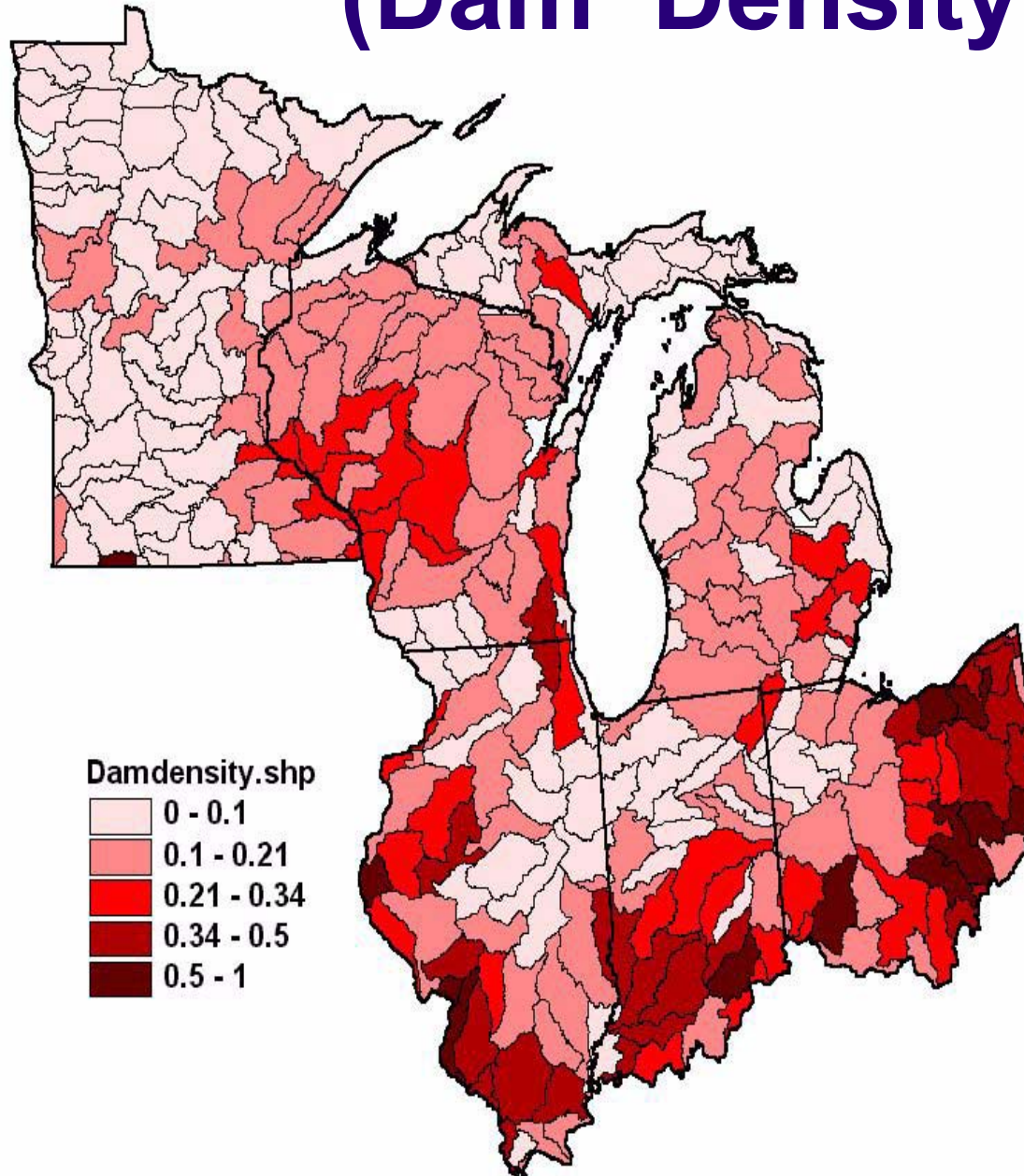
Hazardous Waste Sites (Superfund & RCRA)



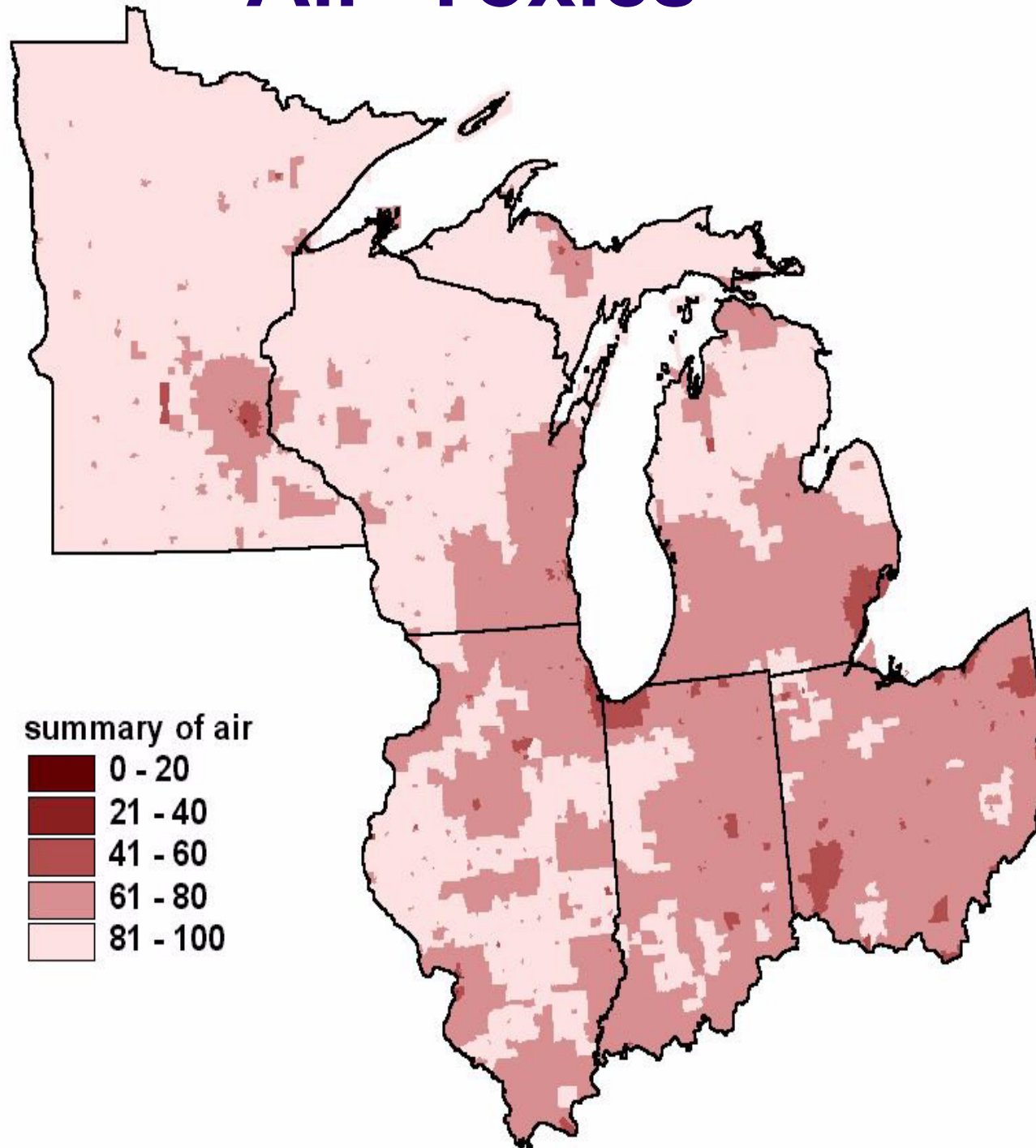
Water Quality



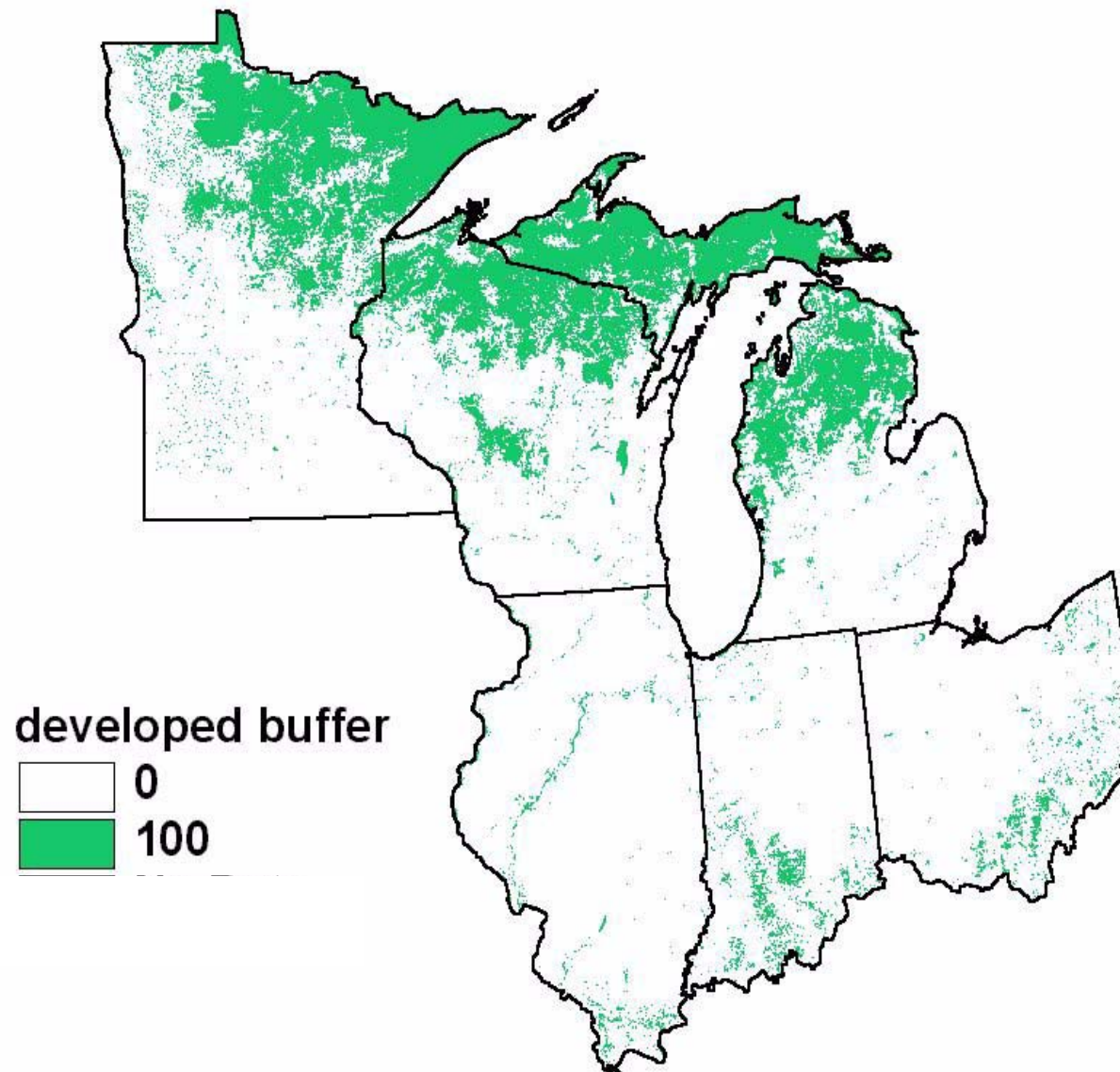
Waterway Obstruction (Dam Density)



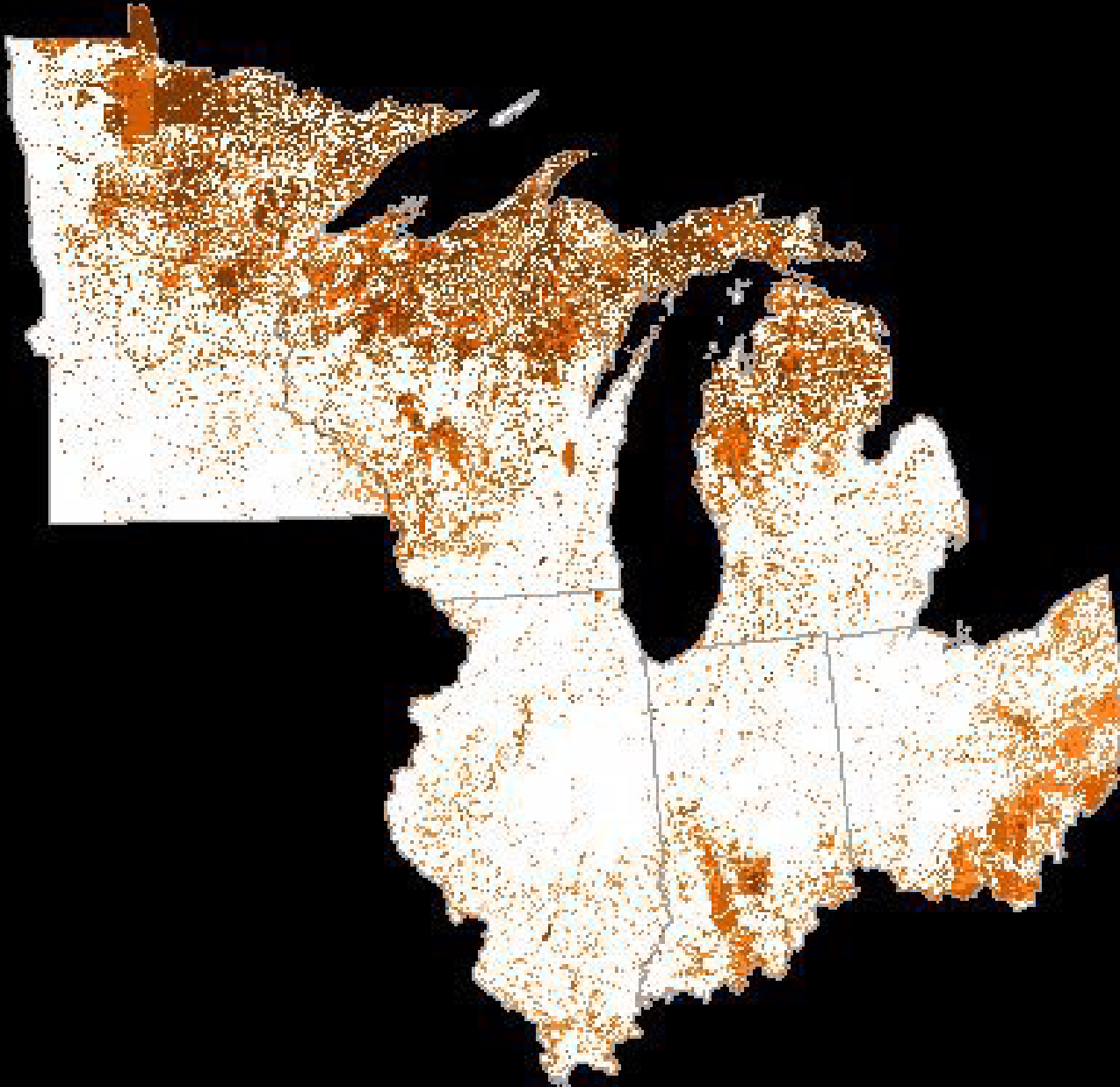
Air Toxics



Developed Land Cover Buffer (Urban & Agricultural)

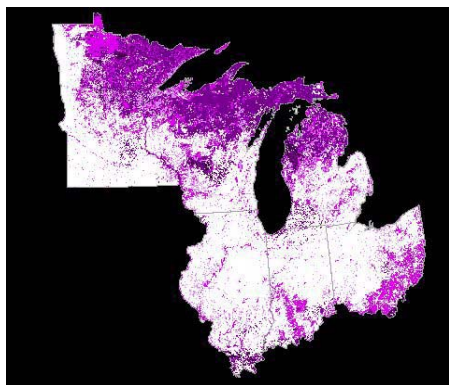
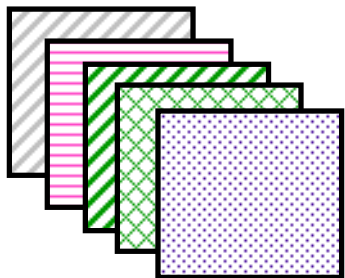


"Sustainability" Composite Layer



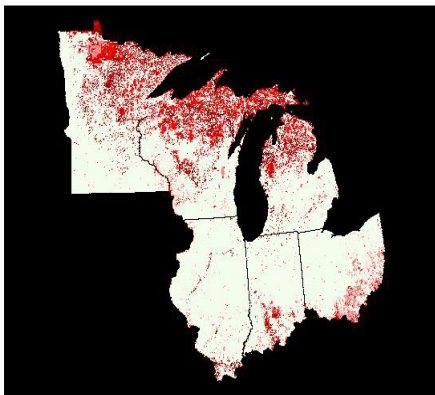
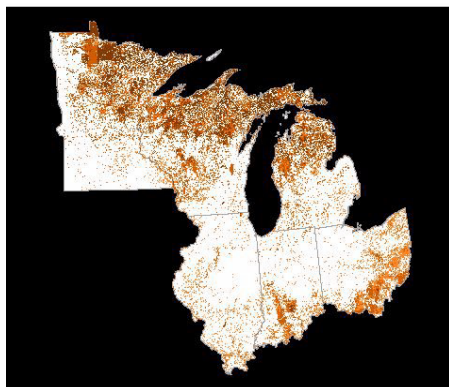
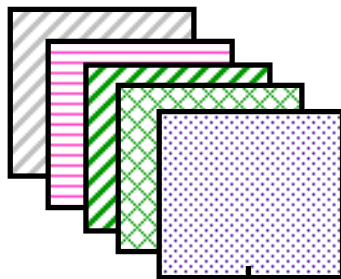
Diversity

(4 data layers)



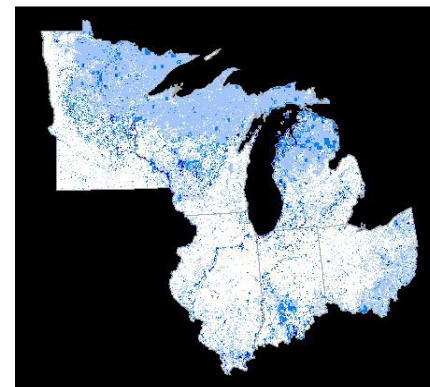
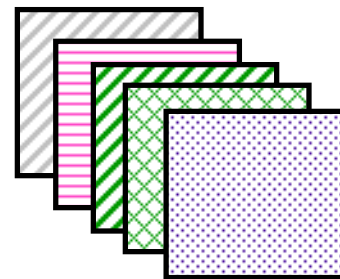
Sustainability

(12 data layers)



Rarity

(4 data layers)



"Rarity" Layers

more rare species and features

fewer rare species and features

100 (better)

(worse) 0



land cover rarity by ecoregion

land cover type is very rare

land cover type is ubiquitous

species rarity per 7.5 minute quad

G1 Heritage rating

G5 Heritage rating

number of rare species per 7.5 minute quad

more species observed

fewer species observed

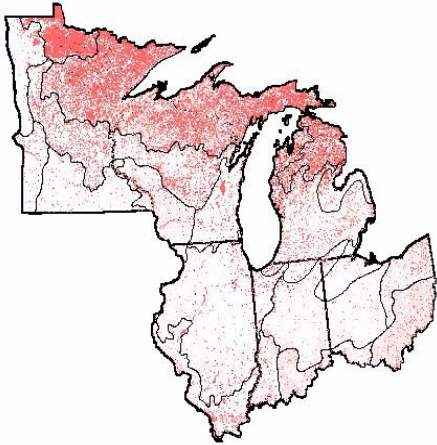
number of rare taxa per 7.5 minute quad

more taxa observed

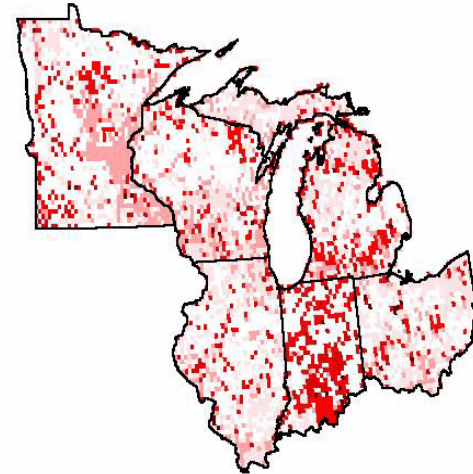
fewer taxa observed

"Rarity" Layers

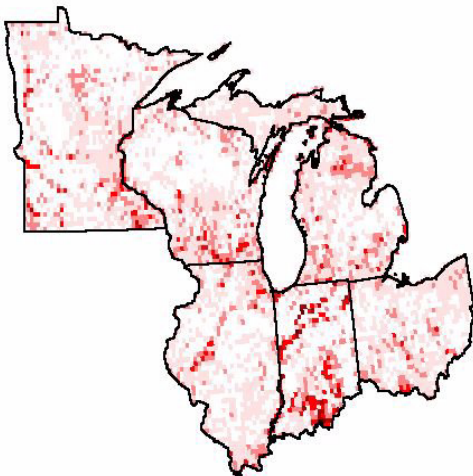
Land Cover Rarity



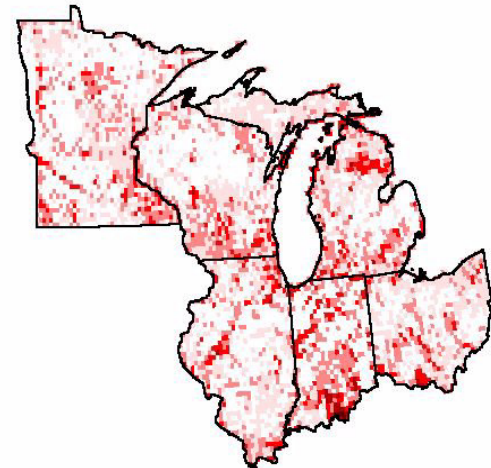
Species Rarity



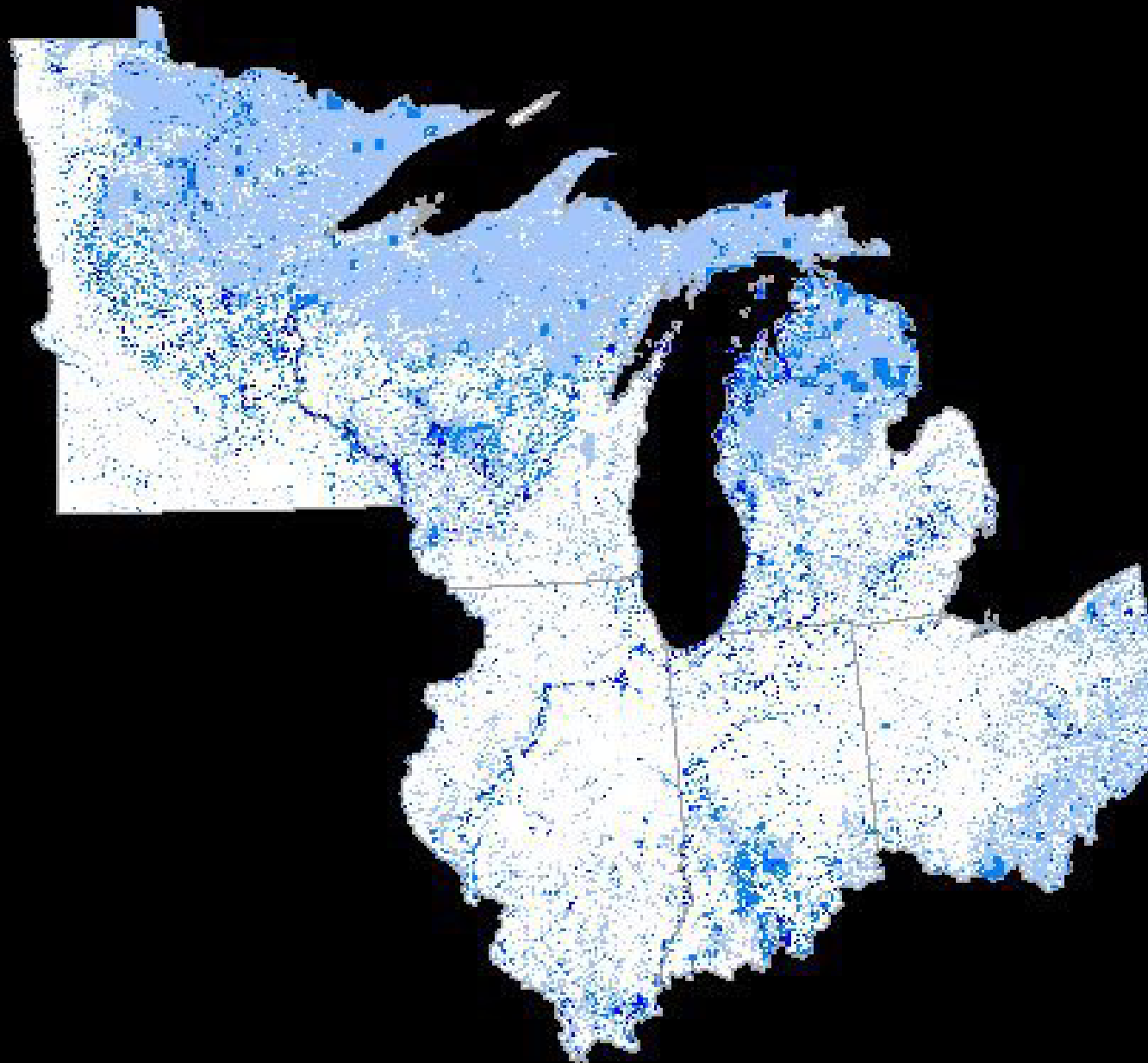
Number of Rare Species



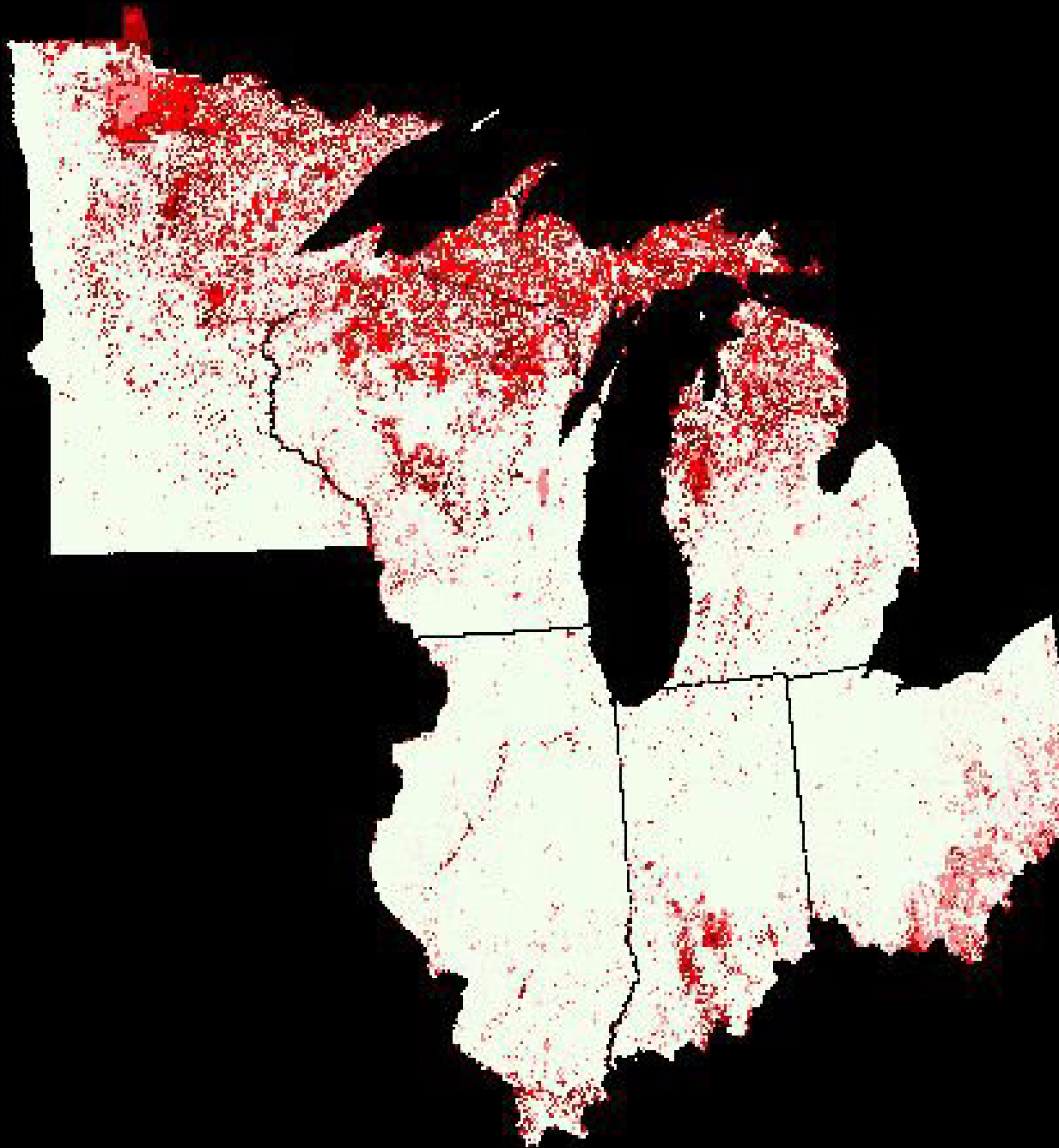
Number of Broad Taxa



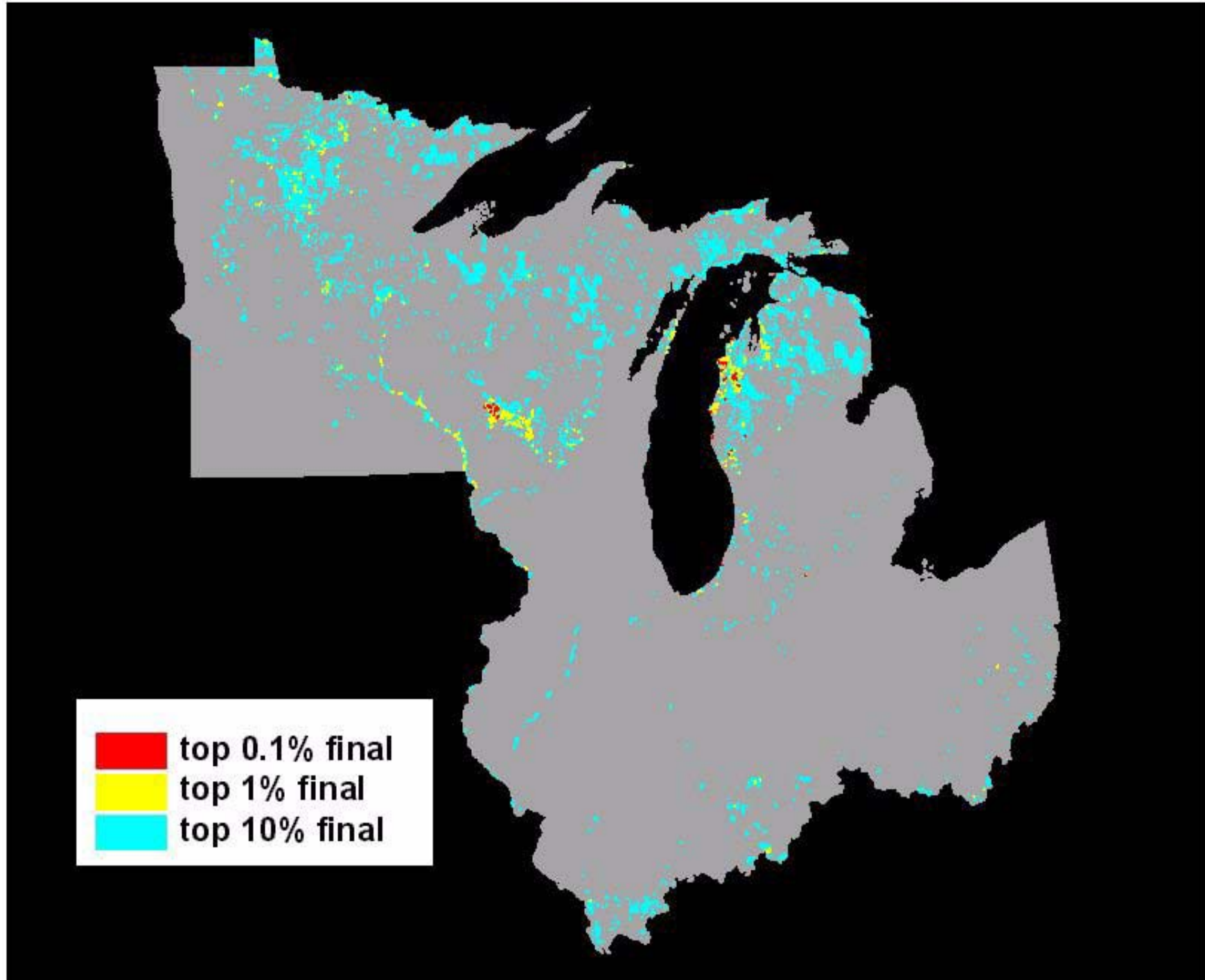
"Rarity" Composite Layer



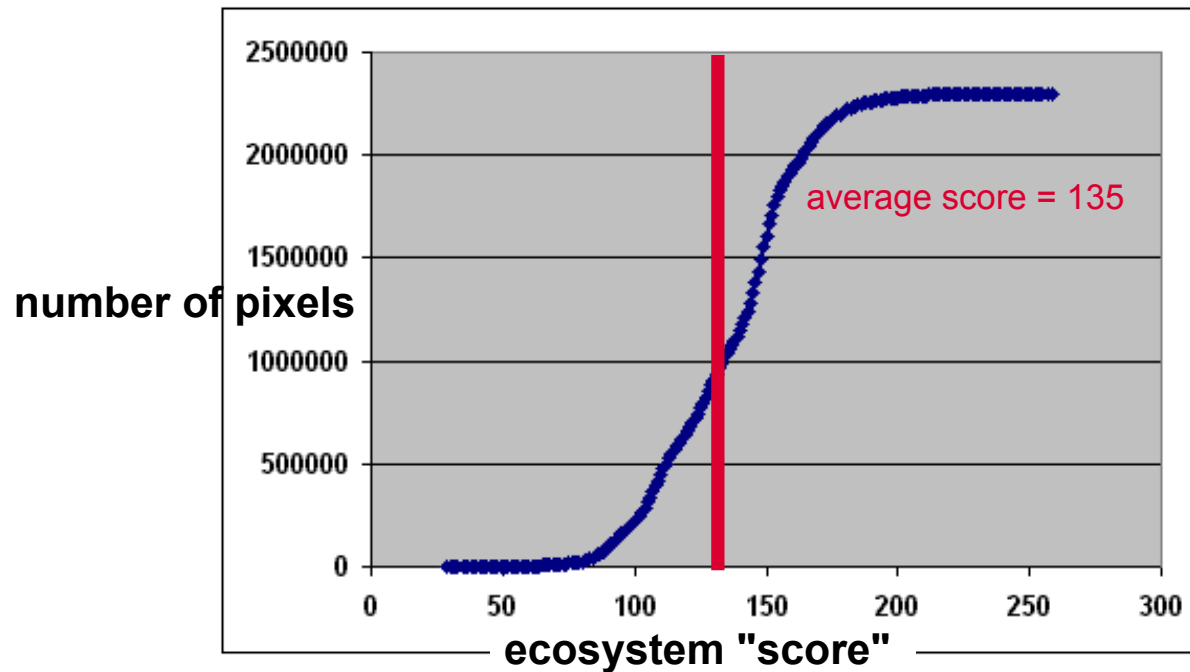
"Final" Composite Layer



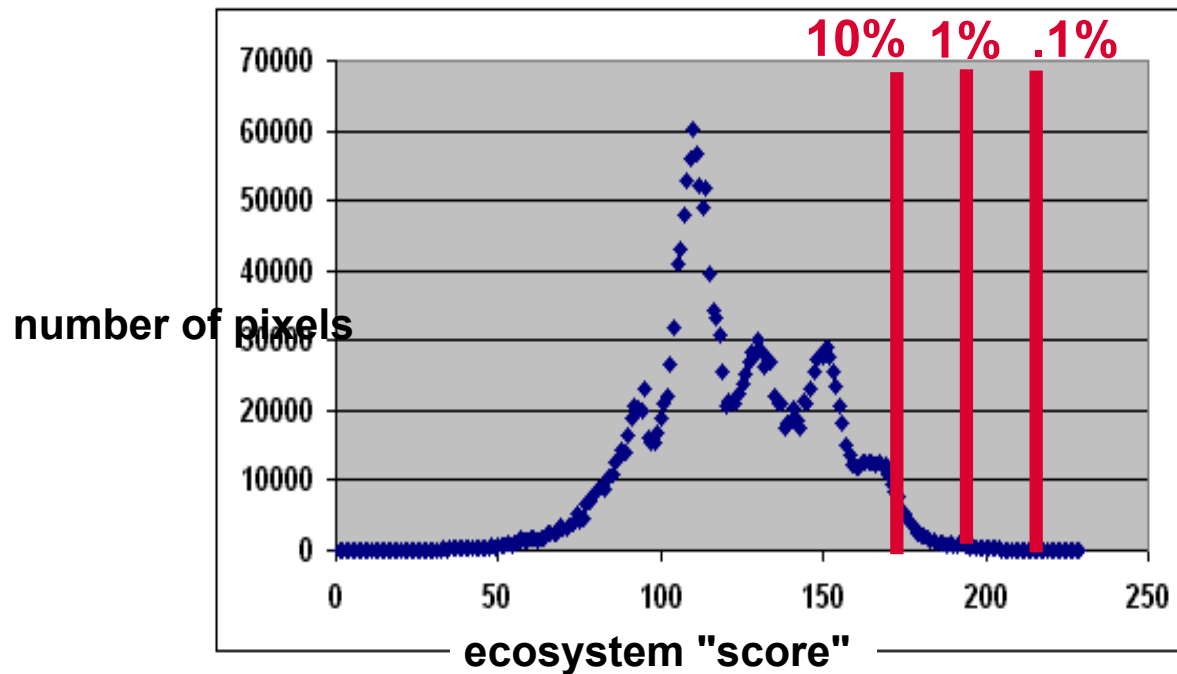
"Final" Composite Layer



"Final" Composite Scores



maximum score = 259
average score = 135
lowest score = 29



Essential Ecological Attributes

developed disturbance

appropriateness of land cover

land cover rarity by ecoregion

land cover diversity calculation by ecoregion

contiguous sizes of individual land cover types

area / perimeter calculation

contiguous sizes of undeveloped areas

temp. and precipitation maxima by ecoregion

road density

Landscape condition

water quality summary from BASINS model

Superfund NPL sites

air quality from OPPT air risk model

hazardous waste cleanup sites

airport noise

Chemical and Physical Characteristics

number of rare taxa per 7.5 minute quad

number of rare species per 7.5 minute quad

species rarity per 7.5 minute quad

Biotic condition

Ecological Processes

Natural Disturbance Regimes

waterway obstructions

waterway impoundments per 8 digit HUC

Hydrology/Geomorphology

Primary Collaborators

Charles Maurice & Mary White
Critical Ecosystems Team

Amy Mysz
Pesticides Program

Robert Beltran
Gt. Lakes Nat. Program Office

Mike Gentleman
Water Division

Lawrence Lehrman
Office of Information Services

Brenda Jones
Superfund Division

Dan Mazur
Waste Management Program